

Ovation™ WP100 Controller Series

Features

- CPU module for small and medium-sized wind turbines
- Safe operation in harsh environments
- Maintenance free – no fans and no batteries that need replacement
- Advanced event-based data logging and storage
- Ethernet, serial RS232/RS422/RS485 and USB 2.0 port
- 16 digital inputs/outputs, 4 high-speed digital counters
- 4 PT100 inputs, 4 analog inputs and 1 analog output
- 1 CAN/CANopen interface
- Direct integration with safety system
- 1 Grid measurement (3 current and 3 voltage inputs)
- Built-in multiport Ethernet switch
- Built-in GPS receiver



Overview

The Ovation™ WP100 platform is specially designed for control of small and medium-sized wind turbines. The basic variant, WP100 controller – 00, has a set of various onboard I/O channels that makes it possible to use the controller as a standalone (w/o additional I/O modules) to control less complex systems. At the same time, it is possible to connect up to 3 WP-line I/O modules when more I/O channels are needed.

The onboard grid interface makes it possible to calculate main grid parameters by precise and reliable DSP algorithms according to IEC 61400-21 standards. The controller is equipped with two high-speed interfaces that work as separate network interfaces. The controller also features safety chain relay logic. The WP100 controller–31 with built-in multiport Ethernet switch (among others, includes fiber optic 100BASE-FX port) can be extended with more I/O groups via Backbone interface. The WP100 controller–32 has a built-in GPS receiver and can provide geographic coordinates and accurate time for the system.

All controllers of the WP100 platform support CANopen Master functionality (optionally). A special application is required to run CANopen and can be delivered on demand.

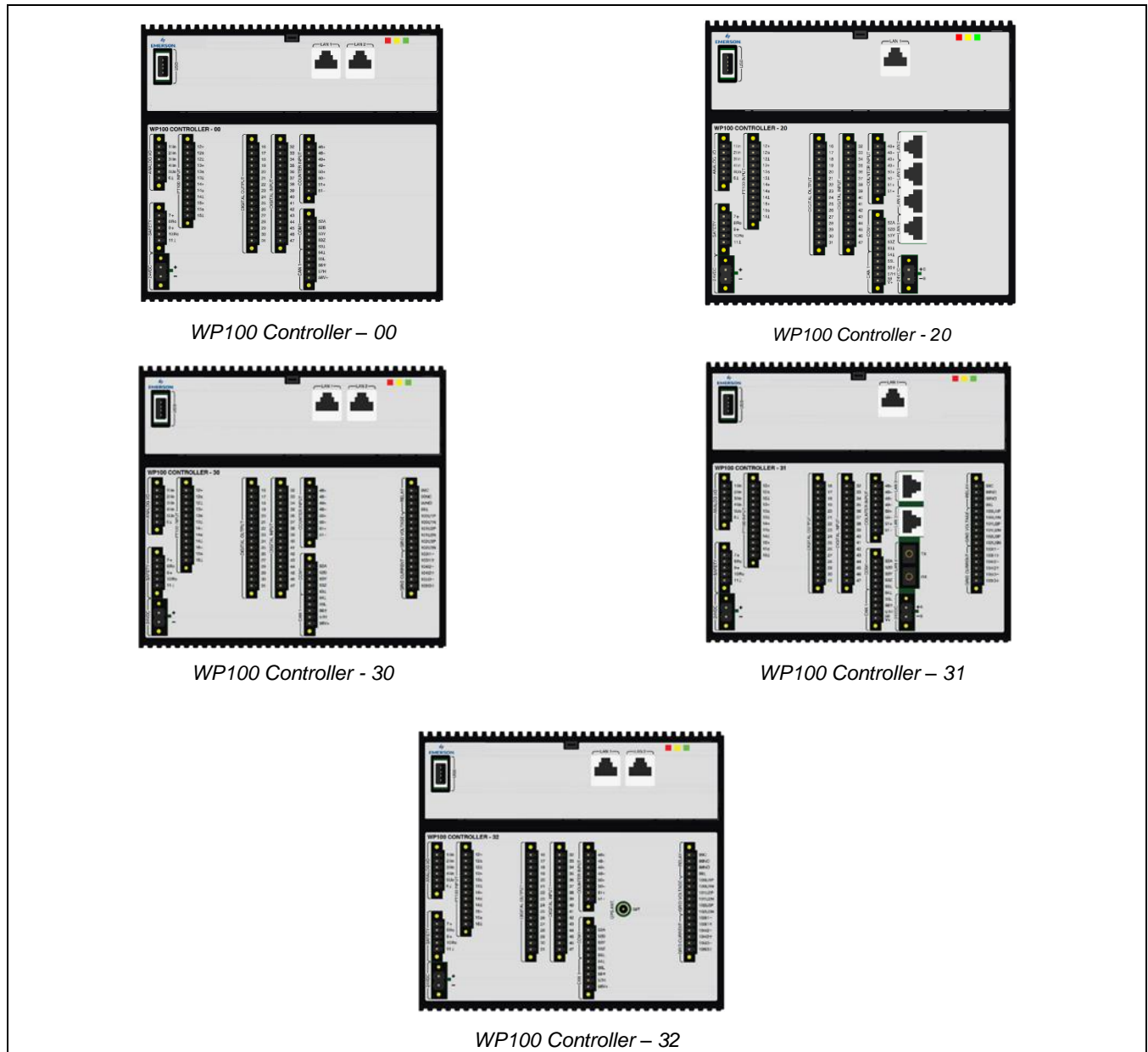
All controllers of the WP100 platform are equipped with internal maintenance-free power back-up, ensuring all data is stored in the event of system power failure (UPS shutdown/failure) and program update. The USB 2.0 port can be used with USB devices complying with the USB Mass Storage Class Specification, like USB flash drives and hard disc drives, allowing storage of up to 2 TB of data. The controller uses the advanced OS1xx operating system software, featuring the failsafe flash file system, TCP/IP protocol stack, WEB-server, plug-and-play identification/configuration of all WP-Line modules, status code system, 30-year summation structure, menu system and log systems.

The OS1xx Operating System API is 100% backward compatible with the OS4x00 operating systems family – this ensures that existing applications that run on WP4100 and WP4200 platforms can be installed on the WP100

platform controllers without any modification or recompilation when the hardware setup is compatible. The controller handles the execution of up to 10 different synchronous/asynchronous applications running in parallel. As an example, this can be: turbine control application, park control application, standard communication protocols, customer specific communication protocols, CoDeSys RTS, etc.

The controller supports the IEC 61131-3 (CoDeSys) PLC programming languages as well as advanced programming in C and C++, using Ovation Green Engineering Tools or other programming tools of your choice.

WP100 Controller Variants



Technical Data

CPU System					
CPU	ARM Cortex™ - A8 1000 MHz				
DDR III RAM	1024 MB				
Flash disk	1024 MB				
USB					
USB type	Host, type A connector				
USB version	2.0				
Supported devices	USB mass storage class (up to 2 TB)				
Ethernet Copper LAN Port					
Controller variant	- 00	- 20	- 30	- 31	- 32
Number of ports	2	5	2	3	2
Communication speed	10/100 Mbit/s				
Connector	RJ45 shielded				
LAN4 Ethernet Optical Communication Port (WP100 Controller – 31 only)					
Communication speed	100 Mbit/s				
Range, maximum recommended	2000 m				
Fibre type	62.5/125 µm				
Wavelength	1300 nm				
Relay Output - Safety					
Isolation type	Relay contact				
Nominal voltage	24 VDC				
Input current/signal "1"	10 mA to 1 A				
Input impedance	2.4 kΩ				
Serial Communication Port - COM					
Port type	RS485/RS422/RS232				
RS232 mode:					
Communication speed	1.2 to 230.4 kBAUD (software configuration)				
Max. cable length	5 m				
Recommend cable type	Multi-wire cable with shielding				
RS485/RS422 mode:					
Communication speed	1.2 to 115.2 kBAUD				
Max. cable length	max. 1200 m at 9.6 kBAUD				
Recommend cable type	Multi-wire cable with shielding				

Termination	Mount at line ends
CAN Communication Port	
Galvanic isolation	Yes
Cable impedance	120 Ω
Communication speed	10 kbit/s to 1 Mbit/s
Max. cable length, examples	30 m @ 1 Mbit/s
	100 m @ 500 kbit/s
	500 m @ 125 kbit/s
Digital Inputs	
Number of inputs	16 with common ground
Galvanic isolation	No
Nominal voltage:	
Signal "1"	15 to 30 VDC
Signal "0"	0 to 5 VDC
Input current	max. 25 mA
Input impedance	min. 2400 Ω
Minimum pulse width	20 ms
Sampling rate	50 Hz
Digital Outputs	
Number of inputs	16 with common ground
Galvanic isolation	No
Output voltage:	
Low level (Off)	0 to 2 VDC
High level (On)	0.95 x supply voltage
Output current	max. 0.25 A for each
Number of groups	2
Points per group	8
Overall "group current limit"	2 A
Minimum load impedance	100 Ω
Protection from short circuit events	Yes
High-speed Counter Inputs	
Number of inputs	4
Galvanic isolation	Yes
Nominal voltage:	
Signal "1"	15 to 30 VDC

Signal "0"	0 to 5 VDC
Input impedance	2400 Ω
Frequency range	0.01 Hz to 80 kHz
PT100 Inputs	
Number of inputs	4
Galvanic isolation	Yes
Temperature measuring range	-40 to +211 °C
Accuracy	± 0.5 % of full scale
Resolution	0.1 °C
Current PT100 input	max. 1 mA
Conversion time for each channel	max. 250 ms
Analog Inputs	
Number of inputs	4 with common ground
Galvanic isolation	Yes
Input current	0 to 20 mA
Analog bandwidth	0 to 100 Hz
Accuracy	± 0.5 % of full scale
Measurement resolution	0.01 mA
Input resistance	max. 200 Ω
Analog Output	
Number of outputs	1
Galvanic isolation	Yes
Output range	0 to 10 V
Analog bandwidth	0 to 300 Hz
Minimum load resistance	1 k Ω (max 10 mA @ 10 V)
Accuracy	± 0.5 % of full scale
Resolution	2.66 mV
GPS Receiver (WP100 Controller – 32 only)	
GPS information	Coordinates, time information
Connector type	SMA female receptacle
RF input impedance	50 Ohm - 1575.42 MHz
Power supply for antenna	3.3 V up to 30 mA
Galvanic isolation	Yes
Grid Measurement Input (Except WP100 Controller – 00 and –20)	
No. of current inputs	3

Current input range	1 A rms				
Current input impedance	40 mΩ				
Current accuracy	±0.5 % of full scale, within measurement frequency and operating temperature range				
No. of voltage inputs	3				
Voltage input range	18 V rms				
Voltage input impedance	100 kΩ				
Voltage accuracy	±0.3 % of full scale, within measurement frequency and operating temperature range				
Measurement frequency bandwidth	40 Hz to 9 kHz				
Relay Output – Grid Measurement (Except WP100 Controller – 00 and –20)					
Isolation type	Relay contact				
Nominal voltage	24 VDC				
Input current/signal “1”	10 mA to 1 A				
Input impedance	2.4 kΩ				
WP-Line BUS					
Nominal voltage	12 VDC (10.5 to 13.5 VDC)				
Standard module load	6				
External 24 V Supply					
Controller variant	– 00 – 20 – 30 – 31 – 32				
Current consumption @24VDC:					
Typical (all digital outputs at '0' state)	0.27 A	0.36 A	0.35 A	0.48 A	0.37 A
Maximum (all digital outputs at '1' state)	4.37 A	4.46 A	4.45 A	4.58 A	4.47 A
Required voltage	24 (19 to 30) VDC				

Module Power Consumption					
Controller variant	– 00	– 20	– 30	– 31	– 32
Typical (excluding load on digital outputs)	6.5 W	8.6 W	8.4 W	11.5 W	8.9 W
Permissible Ambient Conditions					
Operation temperature	-30 to +60 °C (fanless operation)				
Storage temperature	-40 to +85 °C				
Relative humidity	max. 95 % RH (non-condensing @ 40 °C)				
Operation altitude	max. 2000 m above sea level (up to 4000 m at derated temperature)				

Mechanical Information					
Controller variant	- 00	- 20	- 30	- 31	- 32
Weight	0.52 kg	0.58 kg	0.56 kg	0.60 kg	0.58 kg
Dimensions (WxHxD)	170 x 165 x 65 mm				
Required gap (top/bottom)	min. 25 mm				
Protection Degree	IP30				
Applied Standards					
Damp heat	EN 60068-2-78				
Vibration	EN 60068-2-6				
Bump	EN 60068-2-27				
Shock	EN 60068-2-27				
Temperature	EN 60068-2-1, EN 60068-2-2 and EN 60068-2-14				
EMC	EN 61000-6-2 (Immunity standard for industrial environments) EN 61000-6-4 (Emission standard for industrial environments) EN 61000-4-7:2002 + A1:2009 (Testing & measurement techniques) General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto.				
Power quality of wind turbine	EN 61400-21, Wind Turbines - Part 21: Measurement and assessment quality characteristics of grid-connected wind turbines				
Grid codes reference document	BDEW: Generating Plants Connected to the Medium-Voltage Network (June 2008)				

Configuration List

Part Description	Connection Speed, Mbit/s					Grid Measurement Input	GPS Receiver
	LAN1	LAN2	LAN3	LAN4	LAN5		
WP100 CONTROLLER - 00	10/100	10/100	-	-	-	-	-
WP100 CONTROLLER - 20	10/100	10/100	10/100	10/100	10/100	-	-
WP100 CONTROLLER - 30	10/100	10/100	-	-	-	x	-
WP100 CONTROLLER - 31	10/100	10/100	10/100	100	-	x	-
WP100 CONTROLLER - 32	10/100	10/100	-	-	-	x	x

Ordering Information

Part Number	Variant	Part Description
OG9780100	00-01-00	WP100 controller - 00
	20-01-00	WP100 controller - 20 (4x RJ45)
	20-01-01	WP100 controller - 20 (4x RJ45) Coated PCB
	30-01-00	WP100 controller - 30 (Grid)
	31-01-00	WP100 controller - 31 (Grid and Fiberoptic)
	32-01-00	WP100 controller - 32 (Grid and GPS)

Accessories	
OG978800101	WP-Line BUS flat cable 27 mm molded
OG978800202	WP-Line BUS terminator MK II
OG978910001	Connector kit screw black WP100 controller – 00
OG978912001	Connector kit screw black WP100 controller – 20
OG978913001	Connector kit screw black WP100 controller – 30 / – 32
OG978913101	Connector kit screw black WP100 controller – 31
OG9788100	Serial cable RS485 WP100-xx - WP4059 2.5 m
OG9788101	Serial cable RS232 WP100-xx - PC 3 m
OG978802320	Cable WP100-3x / WP3090 2 m
OG3389210	Ethernet patch cable RJ45, Cat. 6 STP shielded grey 1 m
OG3389220	Ethernet patch cable RJ45, Cat. 6 STP shielded grey 2 m
OG3389250	Ethernet patch cable RJ45, Cat. 6 STP shielded grey 5 m
OG3389310	Ethernet patch cable RJ45, Cat. 6 STP shielded grey 10 m
OG3389330	Ethernet patch cable RJ45, Cat. 6 STP shielded grey 30 m
OG3370515	Fiber optical patch cable 2X 62.5µm SC/SC-D 1 m
OG3370525	Fiber optical patch cable 2X 62.5µm SC/SC 2 m
OG3370545	Fiber optical patch cable 2X 62.5µm SC/SC-D 5 m
OG8945280	GPS active antenna
OG8661080	GPS antenna mount, 90°
OG8661071	GPS antenna mount straight
OG746813510	GPS antenna cable RG58 TNC - SMA 10 M

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